

ARTIFICIAL INTELLIGENCE: THE GAME CHANGER IN SCIENTIFIC RESEARCH

BY

**Paul Hassan Ilegbusi (RCHP, FIMS, FIMC, DMIARC)
Senior Lecturer and Deputy Director (Community Health)
Head Of Department, Community Health
Ondo State College Of Health Technology, Akure**

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ABOUT ME

- Registered Community Health Practitioner since 1996.
- Dignitary Member of International Academic and Research Consortium, Kenya.
- Member of Centre for Research, Innovation, Development and Entrepreneurship (CRIDE), United Kingdom.
- Fellow of the Institute of Management Specialist, London.
- Fellow of the Institute of Management Consultancy, Nigeria.
- Professional Member of QUVAE Research and Publications, India.
- An Examiner and Marker for Community Health Practitioners Registration Board of Nigeria (CHPRBN).
- Public Health researcher with some local and international publications.
- A speaker in both local and international scientific conferences.
- Member of African Reproducibility Network.
- Member of African Community for Systematic Review and Meta-Analysis, Rwanda.



OUTLINE

- Background and definition of AI.
- Importance of AI in modern science.
- The role of AI in scientific research.
- Applications of AI in various scientific fields.
- AI tools in Africa.
- AI tools used in scientific research.
- Challenges of Artificial Intelligence.
- The future of AI in scientific research.
- AI research collaborative platforms.
- Sustaining the adoption of AI in Africa.
- Demonstration on the use of some AI tools.
- Conclusion.
- References.



BACKGROUND AND DEFINITION OF AI

Artificial Intelligence (AI) has evolved significantly since its inception in the mid-20th century.

Initially envisioned as machines capable of mimicking human intelligence, AI today encompasses a broad range of technologies, including machine learning, deep learning, natural language processing, and neural networks.

These technologies enable computers to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

IMPORTANCE OF AI IN MODERN SCIENCE

AI's integration into scientific research marks a pivotal advancement.

Its ability to process vast amounts of data and uncover patterns beyond human capability positions AI as a transformative tool in various scientific disciplines.

This paper explores AI's profound impact on scientific research, highlighting its role, applications, challenges, and future prospects.



THE ROLE OF AI IN SCIENTIFIC RESEARCH

- **Enhancing Data Analysis and Interpretation:** AI excels at analyzing large datasets quickly and accurately.
- **Accelerating Research Processes:** AI automates many routine tasks in scientific research, such as data entry and preliminary analysis, significantly speeding up the research process.
- **Improving Accuracy and Precision:** AI models often surpass human accuracy in various tasks. For instance, in medical imaging, AI systems have demonstrated higher accuracy rates in detecting abnormalities such as tumours in radiographs. These advancements lead to more reliable and reproducible research findings, reducing the margin of human error.

APPLICATIONS OF AI IN VARIOUS SCIENTIFIC FIELDS

Biomedicine and Healthcare: AI has revolutionised drug discovery and development by predicting the efficacy of new drugs and identifying potential side effects early in the process.

Environmental Science: AI-driven climate models predict weather patterns and climate change with greater precision.

Physics and Astronomy: AI aids in the analysis of data from particle accelerators, enhancing the understanding of fundamental particles and forces. In astronomy, AI processes vast amounts of data from telescopes to identify celestial bodies and phenomena that might otherwise go unnoticed.

Materials Science: AI accelerates the discovery of new materials by predicting their properties and behaviors under various conditions.

AI TOOLS IN AFRICA

- In Kenya: Ilara Health – this AI tool offers accurate and affordable diagnostics to communities in rural areas. They also have Nuru AI tool, which identifies and diagnoses crop diseases. There is Apollo Agriculture, which utilises AI machine learning to estimate the solvency of farmers and assist in formulating better decisions concerning loans to be granted to specific farmers.
- In Ghana: They have minoHealth AI labs that focused on the automation of radiology by the application of deep learning algorithm.
- In Egypt: They developed mhealth aps that utilise AI for nursing triage and tele-nursing services.

AI TOOLS USED IN RESEARCH

- **Explain paper:** This is an AI tool for understanding literature. Highlight a particular word or phrase in the paper and it will explain it fully. <https://www.explainpaper.com/>
- **Paper digest:** This is an AI tool for LR. It summarises papers in few seconds. Click the DOI of the paper and click to Digest. <https://www.paperdigest.org/>
- **Chatdoc.com:** This tool is used for LR. Type in your question based on the paper uploaded and it does the rest for you. <https://chatdoc.com/>
- **Humata.ai:** Ask question based on your paper and the AI tool will summarise the paper for you. <https://www.humata.ai/>



AI TOOLS USED IN RESEARCH¹⁰

- **Semantic scholar:** This is an AI tool for understanding a paper at a glance. It extracts meaning and identifies connections from within papers. <https://www.semanticscholar.org/me/research>
- **Connected papers:** This is a unique, visual tool to support researchers find and explore papers relevant to their field of interest, for creating bibliography, discovering most relevant papers, and making sure an important paper is not missed. <https://www.connectedpapers.com/auth>
- **Research rabbit.ai:** It works like Connected papers. It links papers. <https://www.researchrabbit.ai/>
- **Dimensions ai:** This is an AI tool that summarises paper. <https://www.dimensions.ai/>
- **Chisquares.com:** This is a powerful AI tool that effortlessly collects and analyses data. It could be used for collaborative researches. <https://www.chisquares.com/>



AI TOOLS USED IN RESEARCH¹

- **Elicit.com:** This is an AI tool for full LR because it summarises and has a lot of columns for reviewing papers. <https://elicit.com/>
- **Scholarcy.com:** This is an Article summariser and Flashcard generator. <https://www.scholarcy.com/>
- **Scispace ai:** This is used for Paraphrasing, LR, and Summarising paper. <https://typeset.io/>
- **Scite.ai:** This AI tool is used for summarising research papers, in-text citations, etc. <https://scite.ai/>
- **Wordtune read.ai:** This requires you to upload your pdf paper and it will do the summary. <https://www.wordtune.com/>

AI TOOLS USED IN RESEARCH

- **Litmaps.com:** This is an AI tool used for searching relevant papers for LR. It could be used to find research gaps in various papers. <https://www.litmaps.com/>
- **Open Knowledge maps.org:** Get an overview of a research topic, find Open Access papers, identify relevant concepts, and separate the wheat from the chaff, using this AI tool. <https://openknowledgemaps.org/>
- **Citefast:** This is an AI tool used for Citation and Referencing. Copy the title of the paper and paste it to search. https://www.citefast.com/?s=APA7#_Webpage
- **MyBib:** This AI tool is also used for referencing. Copy the title of the paper and paste to search, save and download. <https://www.mybib.com/>

CHALLENGES OF ARTIFICIAL INTELLIGENCE

- **Data Privacy and Security:** The use of AI in scientific research raises concerns about data privacy and security, especially when handling sensitive information such as genetic data or patient records. Ethical guidelines and robust security measures are essential to protect data integrity and privacy.
- **Bias:** AI models can inadvertently perpetuate biases present in their training data, leading to skewed results.
- **Transparency and Reproducibility:** AI's "black box" nature often makes it difficult to understand how decisions are made, posing challenges for transparency and reproducibility. Developing interpretable AI models and documenting the decision-making processes are critical for maintaining scientific integrity and trust.

THE FUTURE OF AI IN SCIENTIFIC RESEARCH

1. Emerging Trends and Technologies:

AI continues to evolve, with advancements in algorithms and computational power expanding its capabilities.

Emerging technologies, such as quantum computing, promise to further enhance AI's problem-solving potential, enabling breakthroughs in scientific research.

Interdisciplinary Innovations:

The fusion of AI with other cutting-edge technologies, such as bioinformatics and nanotechnology, is driving new interdisciplinary research initiatives.

Collaborative platforms and open science initiatives are fostering innovation by making AI tools and datasets widely accessible to researchers worldwide.



AI RESEARCH COLLABORATIVE PLATFORMS

1. **Open Science Framework (OSF):** This is a free, open-source platform for managing and sharing projects. It allows researchers to collaborate, document, and share their research workflow, data, and materials (<https://osf.io/>).
2. **GitHub:** This is a web-based platform for version control and collaboration on software development projects. Researchers can use GitHub to share and collaborate on research code, data, and methods (<https://github.com/>).
3. **Chisquares.com:** This is a platform for researchers to share research projects, data, and methods; collaborate with others in real-time; discover and re-use existing research; track and reproduce research results; and integrate with other open science platforms (<https://www.chisquares.com/>).
4. **DataCite:** This is another platform supporting open science. DataCite provides persistent identifiers (DOIs) for research data, making it citable, shareable, and discoverable (<https://datacite.org/>).



SUSTAINING THE ADOPTION OF AI IN AFRICA

- Prioritising of data governance.
- Prioritising capacity building.
- Development of local data sets.
- Involvement of innovators, policymakers, and academics in AI conversations.
- Establishment of comprehensive AI policies and frameworks.
- Development of responsible AI ecosystem.
- Investing in research and knowledge transfer.
- Fostering local innovation.

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DEMONSTRATION ON SOME AI TOOLS

1. Elicit.com
2. Typeset.io
3. Scholarcy.com
4. Chisquares.com

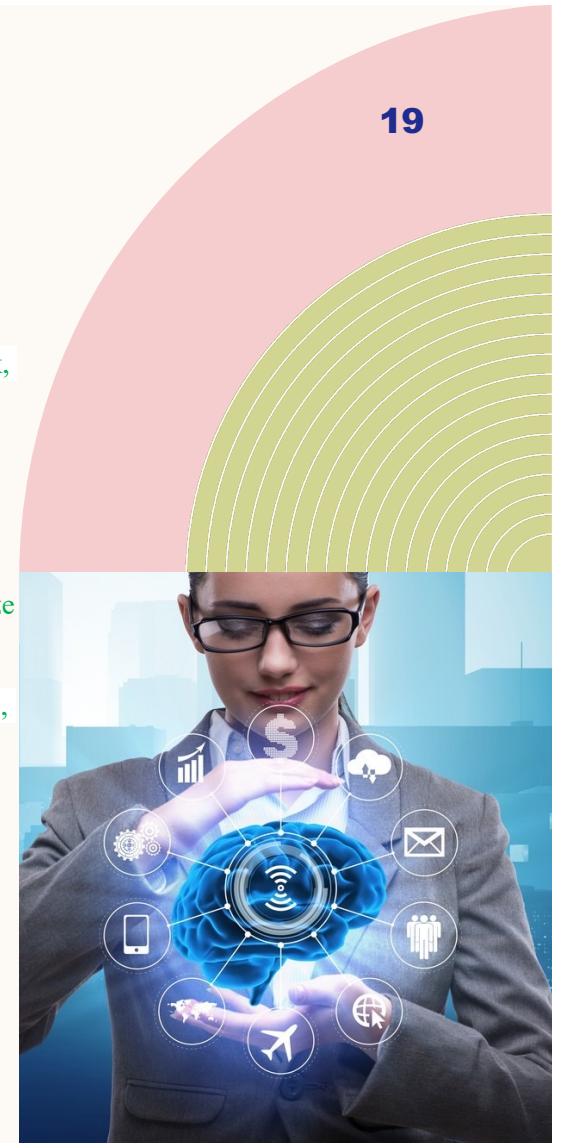


CONCLUSION

- AI is undeniably a game changer in scientific research, offering tools and techniques that enhance data analysis, accelerate research processes, and improve accuracy.
- Its applications span numerous fields, from biomedicine to environmental science, physics, and materials science.
- As AI technology advances, its integration into scientific research will likely deepen, unlocking new possibilities and accelerating discoveries.
- Addressing the ethical and practical challenges associated with AI will be crucial to ensuring its beneficial impact on science and society.

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THANK YOU

Paul H. Ilegbusi

+234-803-492-2991

princeilegbusi@gmail.com

<https://orcid.org/0000-0003-3644-0553>

